Developing Synoptic Human Stressor Indicators for Assessing the Ecological Integrity of Freshwater Ecosystems

1st Regional Oversight Committee Meeting

Kansas/Missouri Subcommittee
Meeting Notes

Gust Annis (MoRAP) called the meeting to order at 9:00 am. He went over the meeting agenda and Jennifer Ousley (EPA-Region 7) covered some of the meeting logisitcs. Everyone attending the meeting then took some time to introduce themselves.

Gust and Scott Sowa (MoRAP) then collaboratively gave a presentation that covered the background of the project, the goal and objectives, the ideal scenario for quantifying the ecological effects of human-induced stressors, what they believed was achievable given the current state of data and technology, what the overall role of the regional oversight committee was, and what they hoped would be accomplished at today's meeting.

General Comments on the objectives and proposed end products of the project

Chris Schmitt from the US Geological Survey thinks the raw data will be even more valuable than the HSIs from a water quality or regulatory standpoint, and said empirical approaches provide a more direct link to the problems.

Cody Wheeler from the Corps of Engineers was not sure how it could be used for permit review. Stuart Harlan from the Missouri Department of Natural Resources suggested it could be used in a broader sense for permit review. For example, it could be used to develop regional permit review guidelines.

Matt Combes from the Missouri Department of Conservation said the data will be tremendously useful for conservation planning and management for MDC.

Debbie Baker of the Kansas Water Office suggested it might be more of a tool for planning and management rather than permit review. It could be used for generally assessing cumulative impacts and identifying sites for restoration.

Cody Wheeler added that it would be a valuable educational tool.

After the general comments on the project objectives and the proposed products the meeting went into a working session with the initial objectives of;

1. Identifying/producing a list of the principal human threats/stressors that potentially affect the ecological integrity of freshwater ecosystems within EPA Region 7,

2. Identifying potential data sources or ways of quantifying each threat/stressor within a GIS, and
3. Identifying potential contacts for the geospatial data needed to quantify each threat/stressor.

Identifying Principal Threats, Means of Quantification, and Data Contacts

Scott and Gust provided the committee with a list of human threats/stressors that was identified by another committee back in 1999, which was assisting with the development of a human stressor index for the Missouri Aquatic GAP Project. All of the committee members agreed this list would serve as a useful starting point.

Scott suggested we should remove watershed land use/cover from the list since it serves as more of a data source as opposed to an actual stressor. Everyone agreed that specific elements of a land cover data layer should be treated separately (e.g., cropland, grazing land, impervious surface).

Impervious Surface
Impervious surface source data could be land cover or the impervious surface coverage generated by Walt Foster (EPA Region 7) using methods developed by the Athens lab of EPA, which accounts for road and population density.

Cody Wheeler asked if population density was thus redundant with Walt's impervious surface. Chris Schmitt explained that population density is often low in areas with high percent impervious surface and Scott gave the Lake of the Ozarks as an example of that.

Population density source data is census data so Chris Schmitt said we need to figure out how to integrate census blocks with our RSDs. Scott and Gust explained they have dealt with this issue in the past using area-weighted methods.

Storm water systems
There is no standardized database for storm water systems. Sometimes there are combined sewers: combined stormwater and sanitary systems.

Matt Combes suggested we look at separate areas served by sewer system (POTW) vs. those that are not. He said this would be an issue of weighting.

Debbie Baker noted that in Kansas they have a separate permit for those entities that treat wastewater but do not discharge and do not have to get an NPDES permit. They use evaporation but likely do discharge during significant runoff events. She did not know if there is comparable data in the other three states.

Wastewater Treatment Systems and Discharges
The committee recognized that onsite wastewater treatment systems need to be separated from septic systems

Matt Combes suggested we try to further categorize NPDES permits, particularly industrial, into the major constituents they discharge.Walt Foster said there is some overlap in the Hazardous waste data and Industrial Facilities Discharge data.

Superfund, Military, and Toxic Release Sites
Cody Wheeler and Chris Schmitt mentioned we should also include superfund sites and old and current military sites. And Debbie Baker added "classified wells", which are considered groundwater discharges. She said they fall under the underground injection control program of EPA. This pertains to nonsewered areas. Walt Foster said he will look into whether or not this data is available.

Everyone agreed we should separate out superfund and RCRIS sites. And Walt Foster wanted us to include toxic release inventory sites; however, he said there will be an overlap with superfund and RCRIS data. Walt Foster also informed us that the TRI will give actual pounds emitted.

Oil and Gas Wells
Cody Wheeler and Chris Schmitt said that oil and gas wells should be considered and Debbie Baker told us that these data are housed by the Kansas Corporation Commission in Kansas.

Debbie Baker also suggested that we account for residual salt scars from old abandoned oil and gas wells, but no one thought we could get this data.

Roads
Everyone agreed that the potential effects of roads need to be accounted for, using measures such as road density or density of road/stream crossings.

Matt Combes also suggested the need to account for road salting. Chris Schmitt agreed saying in Missouri all numbered and lettered roads are likely being treated with salt. Scott Sowa thought we could get this by calculating densities separately for different road classes contained in the TIGER road files.

Accounting for Best Management Practices?
Cody Wheeler said it would be nice to get at best management practices but Scott Sowa thought that would be impossible.

Debbie Baker suggested trying to account for permanent conservation easements but Scott Sowa said this may create a problem since we cannot account for other best management practices. He gave the following as an example: reach A has no permanent easements but tons of NRCS incentive programs (WRP, CRP, Riparian set aside); reach B has a big easement but no incentive programs. Reach A may be have greater ecological integrity than B, despite not having any permanent easements.

Landfills

State regulatory agencies should have spatial data for landfills.

Airports
The committee wondered if all airports represented in EPA basins? Chris Schmitt also asked if we should attempt to further categorize airports by size, (e.g., international, national, regional, general aviation, military, private). Scott and Gust stated that they had not considered this, but that it was a good idea worth pursuing.

Dispersal Barriers
Matt Combes and Chris Schmitt said road crossings can be viewed from a dispersal barrier or public access standpoint. Scott Sowa suggested that we should add a category for dispersal barriers, and later try to further identify different human infrastructure that serve as barriers. Matt Combes added that we also need to consider low-head dams as a dispersal barriers.

Everyone was concerned that there may not be a consistent data source across R7. Mark Van Scoyoc from the Kansas Department of Wildlife and Parks said the Division of Water Resources may be a source in Kansas.

Gust Annis from the Missouri Resource Assessment Partnership informed everyone that we have looked into isolating gravel roads in Missouri and found it to be unreliable. Matt Combes added that some roads in the Ozarks don't even show up on a map, and Chris Schmitt was surprised how many actually do show up on maps (Delorme maps).

Agricultural Lands
Cody Wheeler stated that we do know to what extent that land cover mapping applications are different. And suggested that agricultural land should be removed and replaced with more detailed categories of: a) pasture/rangeland and b) row and close-grown crops. Chris Schmitt said it was more important to account for soil loss and nutrient/pesticide loss by incorporating soil type and land slope.

Chris Schmitt, Scottt Sowa and Walt Foster all thought that this might be attainable by using SWAT and universal soil loss equation models. But everyone thought it would be impossible to get at the actual farming practices or applications of pesticides and herbicides.

Walt Foster suggested taking the AG census data to get information on what crops are grown in each county and then associate the pesticides and herbicides with these crops to calculate applications by county. And Chris Schmitt proposed getting pesticide and herbicide sales by county which could be linked to the acreage of appropriate crops (eg. atrazine used mainly on corn) to determine application per acre.

Scott Sowa was worried that adding more layers or using more models could lead to compounding errors that propagate throughout the generation of HIS.

Ranging livestock

Matt Van Scoyoc and Chris Schmitt didn't think we could classify all pastureland as containing cows. Walt Foster said the Ag census data has a number of livestock and we could use area-weighted averagages. Cody Wheeler suggested counting cattle numbers by county. However, Matt Combes pointed out that cattle census data are a snapshot taken once a year.

CAFO's

Walt Foster has data for Iowa, Missouri, and Nebraska. Kansas won't give it out. Cody Wheeler said it can be further divided by number of cattle. Mark Van Scoyoc said he has seen data on CAFO's/feedlots for Kansas, and that KDHE likely has the data.
Walt Foster informed us that some CAFOs are not permitted, and Debbie Baker added that cumulatively, these are often worse than the permitted sites.

Channelization

This data is extremely difficult to get. Gust Annis and Scott Sowa said they've tried several different methods using a sinuosity index.

Walt Foster said channelized streams are also captured in NWI. He said he has channelized reaches from NWI for Iowa, Nebraska, and Missouri, but Kansas does not have digital NWI data.

You could average the sinuosity values for upstream and downstream reaches with the reach of interest to get around the problem of the short reaches, suggested Chris Schmitt.

Upland Mining

The US bureau of mines has this data and they break out ferrous, nonferrous and coal in the database, according to Walt Foster. Chris Schmitt offered to point us to the people who generated these data. He also suggested that the state databases would likely be more accurate and comprehensive.

Lead Mines

Chris Schmitt said that lead belt mines (lots) don't necessarily correlate with bad mines in terms of impact. It is better to look at the amount of tailings and residual metals. These can be placed into two categories: active and inactive. Many inactive mines are Superfund sites, active mines are RCRA sites or TRI sites. He thought we would be able to pick up tailings from remotely sensed data. Scott Sowa informed everyone that we have mapped some tailings, and we could use a buffer around point localities and classify all barren lands as tailings. Walt Foster said the US EPA is currently mapping mines in Jasper, Newton, and Cherokee counties.

Coal Mines

Chris Schmitt mentioned that it is difficult to account for differential influences among individual mines. Scott Sowa agreed, saying some are above and some are below ground. Cody Wheeler added that underground mines pose a threat to groundwater, acid mine drainage. Chris Schmitt thought it may be more important to map and quantify strip mine areas. Cody Wheeler thought there may be polygonal data for some mines.

Sand/Gravel Mines

Debbie Baker said mines that occur in areas with extremely shallow groundwater likely pose a big problem for water quality of streams connected to groundwater.
Cody Wheeler offered to get data on permitted sites.

Scott Sowa reminded everyone that there are many unpermitted sites, and talked about a Missouri project trying to map unpermitted sites. He said often, they pose a bigger cumulative effect than permitted sites.

Chris Schmitt informed everyone that open pit barrite mines are a unique problem in Washington county, Missouri and Matt Combes added that salt mines were a big problem in Kansas. Scott Sowa discussed the differences among all these mines. He said it is really dealing with the issue of weighting and everyone agreed it was difficult to differentiate. Chris Schmitt asked if we were to weight mines that superfund, such as RCRA, or TRI should be weighted more heavily than other mines.

Major Reservoirs

Scott Sowa said we already have data for R7, any reservoir falling on a stream classified as small river or larger.

Headwater Impoundments

All agreed we can definitely get permitted sites. Scott Sowa discussed the difficulty of getting smaller impoundments, and talked about methods used for the PL-566 project.

Water Withdrawls

Again, everyone agreed that data on all permitted withdrawls would be available, but we would not be able to get it on the unpermitted withdrawls. Cody Wheeler said a lot of water use is not permitted. Debbie Baker said Kansas has water use for permitted sites.

Flow Diversions

Chris Schmitt and Matt Van Scoyoc thought this should be captured with the water permit data. They said we'll have to see spatial correlation between water withdrawls and flow diversions. Flow diversions, however, do have a differential influence from a

geomorphic standpoint, said Scott Sowa. Everyone wanted to add a water quality standpoint because the diversion is still picking up nutrients, chemicals, and sediment.

Pipelines

Walt Foster has the data but is unable to give it to us. He said he would calculate the metrics we wanted once we knew what they were.

Powerlines

Chris Schmitt said we should also have a category for powerlines because they represent a chemical threat. Gust Annis and Scott Sowa will check with Walt Foster to see if this information is secure.

Forest Management Practices

The committee agreed that this is unattainable, especially on private and state lands.

Introduced species

Matt Combes asked if we can account for local introductions and Scott Sowa stated no, we cannot. Scott explained that we have talked with Bill Pflieger and some are well documented, but most are not. Matt Combes informed us that bass often have an overriding influence on the biological community superceeding all of these other stressors. Cody Wheeler said it was an important secondary effect, but the real threat is the headwater impoundments. We will have to stick with state-level introductions. Scott Sowa said introduced species calculations have to be based on predictive models.

Game Species Management

This committee agreed that we cannot account for this. A dichotomy of scenarios was discussed, in Kansas liberal regulations for LMB would be great, whereas restrictive regulations on SMB in the Ozarks would be great.

Navigation

Cody could get us the navigation streams. Revisit with other group.

Other Issues

Updating of these data
Matt Combes asked about updating this data, but Scott informed him we do not have the money for updates. The real power of this data would be to show changes in conditions through time. But this requires continual updating of the data.

Empirical vs. Relative Quantification of Human Threats/Stressors
Matt Combes added that the data will be useful for identifying reference conditions. He said he prefers the empirical approach, but knows it will be a lot more work. He said he could get approximately 500 samples from MO to assist with this. Mark Van Scoyoc and Ryan Waters said they have over 1,600 sites with fish and macroinvert data which they could provide.

Spatial and Temporal Considerations

The committee agreed that there are no universal definition of what "close" is, and therefore distance-based weighting of stressors might be difficult, if not, dubious.

The committee also agreed that we should quantifying things as precisely as possible, because you can always group data later on, but you can't move in the other direction.

Closing comments
Gust and Scott stated that they would send out the meeting minutes as soon as they got them synthesized and that each of the committee members would be hearing from them in order to schedule the next meeting. Gust then called the meeting to a close at 3:00 pm.